Amendments to the Claims

Please cancel Claims 43, 56, 60, 96-99, 129, 130, 132-135, 148, 166, 167, 174, 185-188, 190, 191, 198, 202 and 203, add new Claims 206-235, and amend the remaining claims as follows:

Listing of Claims

41. (Currently Amended) A method of making a patterned semiconductor film, comprising the steps of:

a) ~~gravure printing, printing by offset lithography, or flexographic~~ printing a solution comprising ~~passivated~~ silicon-containing semiconductor nanoparticles having a passivation layer covalently bound thereto selected from the group consisting of an alcohol, an alcoholate, a thiol, a thiolate, an alkyl group, and an aralkyl group, a first cyclic Group IVA compound of the formula (1):

$$(AH_x)_n, \qquad (1)$$

where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and each A in the formula is independently Si or Ge, and a solvent in a pattern on a substrate; and

b) curing said printed pattern to form said patterned semiconductor film~~, wherein curing said printed pattern comprises irradiating said printed pattern~~.

42. (Canceled)

43. (Canceled)

44. (Currently Amended) The method of Claim [[43]]41, wherein said ~~soluble passivated~~ silicon-containing semiconductor nanoparticles ~~comprise soluble passivated~~ consist essentially of passivated silicon nanoparticles.

45. (Canceled)

46. (Previously Presented) The method of Claim 41, wherein said curing step comprises sintering said printed pattern to form said patterned semiconductor film.

47-50. (Canceled)

51. (Previously Presented) The method of Claim 41, further comprising selectively irradiating portions of said printed solution, and removing either irradiated or non-irradiated portions of said printed solution to form said pattern.

52. (Canceled)

53. (Original) The method of Claim 51, wherein said selectively irradiating substep comprises (i) positioning at least one of said substrate and a mask such that said portions can be selectively irradiated and said non-irradiated portions cannot be irradiated, and (ii) irradiating said layer with ultraviolet light through said mask.

54. (Original) The method of Claim 53, wherein said printing step further comprises the substep of aligning said mask to an alignment mark on said substrate.

55. (Canceled)

56. (Canceled)

57. (Currently Amended) The method of Claim [[166]]207, wherein said printing step comprises inkjet printing, gravure printing, offset lithography, or flexographic printing said solution ~~in said solvent~~ in said pattern onto said substrate.

58. (Previously Presented) The method of Claim 41, further comprising drying said solution and said substrate.

59. (Currently Amended) The method of Claim [[43]]44, wherein said curing step further comprises heating said pattern to a temperature of at least about 200 °C to sinter said ~~soluble~~ passivated silicon ~~semiconductor~~ nanoparticles in said pattern.

60. (Canceled)

61. (Currently Amended) The method of Claim [[60]]41, wherein said curing step further comprises placing said substrate into a chamber, evacuating said chamber, and passing an inert and/or reducing gas into said chamber.

62. (Previously Presented) The method of Claim 41, wherein said pattern comprises lines having a width of from 0.5 to 50 μm.

63. (Original) The method of Claim 62, wherein said lines have an inter-line spacing of from 100 nm to 100 μm.

64. (Previously Presented) The method of Claim 62, wherein said lines have a length of from 2 μm to 2000 μm.

65. (Previously Presented) The method of Claim 62, wherein said lines have a thickness of from 0.01 μm to 500 μm.

66-99. (Canceled)

100. (Currently Amended) The method of Claim [[43]]44, wherein said ~~soluble~~ passivated silicon ~~semiconductor~~ nanoparticles have an average particle diameter of less than 5 nm.

101. (Currently Amended) The method of Claim [[43]]44, wherein said ~~soluble~~ passivated silicon ~~semiconductor~~ nanoparticles have a particle size distribution of from 0.2 nm to less than 10 nm.

102. (Canceled)

103. (Previously Presented) The method of Claim 41, wherein each x in the formula (1) is 2.

104. (Previously Presented) The method of Claim 41, wherein each A in the formula (1) is Si.

105. (Previously Presented) The method of Claim 41, wherein n is 5.

106. (Previously Presented) The method of Claim 103, wherein each A in the formula (1) is Si.

107. (Previously Presented) The method of Claim 103, wherein n is 5.

108. (Previously presented) The method of Claim 106, wherein n is 5.

109. (Currently Amended) The method of Claim 41, wherein the solution consists essentially of said passivated silicon-containing semiconductor nanoparticles, said first cyclic Group IVA compound and said solvent.

110. (Currently Amended) The method of Claim [[43]]44, wherein the solution consists essentially of said ~~soluble~~ passivated silicon ~~semiconductor~~ nanoparticles, said first cyclic Group IVA compound, and said solvent.

111. (Previously Presented) The method of Claim 165, wherein p is 0 or 1, q is at least 1, (z - y) is 0, and Z is B or P.

112. (Previously Presented) The method of Claim 111, wherein R' in the formula (2) is alkyl.

113. (Previously Presented) The method of Claim 41, wherein said solution further comprises a compound of the formula $(ZH_uR_{3-u})_k$, where Z is selected from the group consisting of B, P and As, u is an integer of from 0 to 3, k is 1 or 2, and each R is independently alkyl, $BH_sR''_{2-s}$, $PH_sR''_{2-s}$, $AsH_sR''_{2-s}$ or $AH_tR''_{3-t}$, where s is 0 to 2, t is 0 to 3, and R" is alkyl or AH_3.

114. (Previously Presented) The method of Claim 113, wherein R in the formula $(ZH_uR_{3-u})_k$ is H or AH_3, where A is Si or Ge.

115. (Previously Presented) The method of Claim 113, wherein u is 0 or 3.

116. (Previously Presented) The method of Claim 41, wherein said first cyclic Group IVA compound is present in said solution in a percentage by weight of from 0.1% to 50%.

117. (Currently Amended) The method of Claim 165, wherein said ~~soluble~~ ~~passivated~~ silicon-containing semiconductor nanoparticles, said first cyclic Group IVA compound and said second cyclic Group IVA compound are present in said ink in a percentage by weight of from 0.1% to 50%.

118. (Withdrawn) The method of Claim 41, wherein said solvent is aprotic.

119. (Withdrawn) The method of Claim 41, wherein said solvent is apolar.

120. (Canceled)

121. (Withdrawn) The method of Claim 118, wherein said solvent has a boiling point of less than 250 °C at atmospheric pressure.

122. (Withdrawn) The method of Claim 121, wherein said solvent has a boiling point of less than 150 °C at atmospheric pressure.

123. (Withdrawn) The method of Claim 118, wherein said solvent is selected from the group consisting of alkanes, arenes, and cycloalkanes.

124. (Previously Presented) The method of Claim 41, wherein said solution further comprises one or more additives selected from the group consisting of a tension reducing agent, a surfactant, a thickening agent, and a binder.

125. (Previously Presented) The method of Claim 59, wherein said sintering temperature is at least about 300 °C.

126. (Currently Amended) The method of Claim [[166]]205, wherein said curing further comprises heating said ~~cyclic Group IVA compound(s)~~ printed pattern to a temperature of at least about 100 °C to dry the printed ~~solution~~ pattern.

127. (Previously Presented) The method of Claim 126, wherein said curing step further comprises sintering said dried, irradiated pattern to form said patterned semiconductor film.

128. (Currently Amended) The method of Claim 41, wherein said printing step ~~comprising~~ comprises inkjet printing, gravure printing, offset lithography, or flexographic printing said solution ~~in said solvent~~ in said pattern onto said substrate.

129. (Canceled)

130. (Canceled)

131. (Currently Amended) The method of Claim [[166]]207, wherein curing is conducted under conditions sufficient to form a doped or undoped ~~polygermane or germanium-substituted~~ polysilane that is sufficiently insoluble and/or that has a molecular weight sufficiently high to resist subsequent treatment with processing solvents.

132. (Canceled)

133. (Canceled)

134. (Canceled)

135. (Canceled)

136. (Currently Amended) The method of Claim [[135]]100, wherein the silicon nanoparticles have an average diameter of less than 3.5 nm.

137. (Previously Presented) The method of Claim 44, wherein the silicon nanoparticles have a size distribution range such that at least 95% of the nanoparticles have an average particle diameter of from 0.1 nm to 10 nm.

138. (Previously Presented) The method of Claim 137, wherein the silicon nanoparticles have a size distribution range such that at least 98% of the nanoparticles have an average particle diameter from 0.5 nm to less than 5 nm.

139. (Previously Presented) The method of Claim 116, wherein the first cyclic Group IVA compound is present in the solution in a percentage by weight of from 0.5 to 30 wt.% .

140. (Previously Presented) The method of Claim 139, wherein the first cyclic Group IVA compound is present in the solution in a percentage by weight of from 1.0 to 20 wt.%.

141. (Currently Amended) The method of Claim 117, wherein the ~~soluble passivated~~ silicon-containing semiconductor nanoparticles and first and/or second cyclic Group IVA compound(s) are present in the solution in a percentage by weight of from 0.5 to 30 wt.%.

142. (Currently Amended) The method of Claim 117, wherein the ~~soluble passivated~~ silicon-containing semiconductor nanoparticles and the first and/or second cyclic Group IVA compounds are present in a weight ratio of from 0.1% to 90%.

143. (Currently Amended) The method of Claim [[117]]142, wherein the ~~soluble passivated~~ silicon-containing semiconductor nanoparticles and the first and/or second cyclic Group IVA compounds are present in a weight ratio of from 10% to 50%.

144. (Withdrawn) The method of Claim 41, wherein the solvent has a gas-phase dipole moment of about 2 debyes or less.

145. (Withdrawn) The method of Claim 144, wherein the solvent has a boiling point of about or less than 250 °C at atmospheric pressure.

146. (Withdrawn) The method of Claim 41, wherein the solvent has a gas-phase dipole moment of about 0.5 debye or less.

147. (Withdrawn) The method of Claim 146, wherein the solvent has a boiling point of about or less than 150 °C at atmospheric pressure.

148. (Canceled)

149. (Previously Presented) The method of Claim 124, wherein the one or more additives are present in the solution in an amount of from 0.1 wt.% to 5 wt.%.

150. (Previously Presented) The method of Claim 41, wherein the substrate comprises a semiconductor wafer or a transparent or translucent display window with a two-dimensional array of fields thereon.

151. (Canceled)

152. (Previously Presented) The method of Claim 41, wherein the substrate comprises a glass or plastic window.

153. (Currently Amended) The method of Claim [[166]]207, further comprising irradiating portions of the printed solution with light having a wavelength and/or intensity sufficient to oligomerize or polymerize the irradiated portions of the solution.

154. (Currently Amended) The method of Claim [[166]]207, wherein [[the]] portions of the printed solution are irradiated with light sufficiently to convert irradiated cyclic Group IVA compounds to an insoluble polymer.

155. (Withdrawn – Currently Amended) The method of Claim 41, further comprising removing said solvent from the printed solution prior to curing.

156. (Withdrawn) The method of Claim 59, wherein said sintering temperature is at least 400 °C.

157. (Withdrawn) The method of Claim 41, further comprising cleaning the substrate with the patterned semiconductor film thereon.

158. (Withdrawn) The method of Claim 157, wherein cleaning comprises rinsing the substrate with or immersing the substrate in a cleaning solvent, draining the cleaning solvent from the substrate, and drying the substrate and patterned semiconductor thin film.

159. (Withdrawn – Currently Amended) The method of Claim 157, wherein the cleaning solvent comprises a solvent in which the first cyclic Group IVA compound and/or said silicon-containing semiconductor nanoparticles ~~has a high solubility~~ are substantially soluble.

160. (Previously Presented) The method of Claim 62, wherein said lines have a width of from 1 μm to 20 μm.

161. (Previously Presented) The method of Claim 63, wherein said inter-line spacing is from 200 nm to 50 μm.

162. (Previously Presented) The method of Claim 161, wherein said inter-line spacing is from 500 nm to 10 μm.

163. (Previously Presented) The method of Claim 64, wherein said lines have a length of from 5 μm to 1000 μm.

164. (Previously Presented) The method of Claim 65, wherein said lines have a thickness of from 0.05 μm to 250 μm.

165. (Currently Amended) The method of Claim [[43]]41, wherein said solution further comprises a second cyclic Group IVA compound of the formula (2):

$$(AH_x)_m(AH_yR_{z-y})_p(ZR')_q,$$

where (m + p + q) is from 3 to 12, each of the m instances of x is independently 0, 1 or 2, each of the p instances of y is independently 0, 1 or 2, each of the p instances of z is independently 0, 1 or 2, each of the p instances of (y + z) is independently 1 or 2, each of the q instances of w is independently 0 or 1, at least one of p and q is at least 1, each A in the formula (2) is independently Si or Ge, Z is selected from the group consisting of B, P and As, R' is R or H, and each R in the formula (2) is independently alkyl, $BH_sR''_{2-s}$, $PH_sR''_{2-s}$, $AsH_sR''_{2-s}$ or $AH_tR''_{3-t}$, where s is 0 to 2, t is 0 to 3, and R" is alkyl or AH_3.

166. (Canceled)

167. (Canceled)

168. (Currently Amended) The method of Claim [[166]]207, comprising selectively irradiating portions of said printed solution, and removing either irradiated or non-irradiated portions of said printed solution to form said pattern.

169. (Currently Amended) The method of Claim [[166]]207, further comprising ~~drying~~ removing said solvent from the printed solution prior to curing.

170. (Currently Amended) The method of Claim [[166]]207, wherein said curing step comprises heating said pattern to a temperature of at least about 200 °C to sinter said passivated silicon-containing semiconductor nanoparticles in said pattern.

171. (Previously Presented) The method of Claim 170, wherein said temperature is at least about 300 °C.

172. (Previously Presented) The method of Claim 170, wherein said temperature is at least 400 °C.

173. (Currently Amended) The method of Claim [[166]] 207, wherein said passivated semiconductor nanoparticles ~~comprise~~ consist essentially of silicon nanoparticles and a passivation layer thereon.

174. (Canceled)

175. (Withdrawn – Currently Amended) The method of Claim 173, wherein said passivation layer comprises at least one member selected from the group consisting of an alcohol, an alcoholate, a thiol, a thiolate, hydrogen ~~an AR'_3 group,~~ an alkyl group, an aryl group, and an aralkyl group.

176. (Currently Amended) The method of Claim [[166]]207, wherein said passivated semiconductor nanoparticles have an average particle diameter of less than 5 nm.

177. (Currently Amended) The method of Claim [[166]]207, wherein said passivated semiconductor nanoparticles have a particle size distribution of from 0.2 nm to less than 10 nm.

178. (Currently Amended) The method of Claim [[166]]207, wherein each x is 2.

179. (Currently Amended) The method of Claim [[166]]207, wherein n is 5.

180. (Currently Amended) The method of Claim [[166]]207, wherein said solution further comprises a compound of the formula $(ZH_uR_{3-u})_k$, where Z is selected from the group consisting of B, P and As, u is an integer of from 0 to 3, k is 1 or 2, and R is independently alkyl, $BH_sR"_{2-s}$, $PH_sR"_{2-s}$, $AsH_sR"_{2-s}$ or $AH_tR"_{3-t}$, where s is 0 to 2, t is 0 to 3, and R" is alkyl or AH_3.

181. (Previously Presented) The method of Claim 180, wherein R in the formula $(ZH_uR_{3-u})_k$ is H or AH_3, where A is silicon and one of the instances of A is germanium.

182. (Previously Presented) The method of Claim 180, wherein u is 0 or 3.

183. (Currently Amended) The method of Claim [[166]]207, wherein said ~~cyclogermane or cyclosilagermane~~ first cyclic Group IVA compound is present in said solution in a percentage by weight of from 0.1% to 50%.

184. (Currently Amended) The method of Claim [[166]]207, wherein the solution consists essentially of said passivated semiconductor nanoparticles, said ~~cyclogermane or cyclosilagermane~~ first cyclic Group IVA compound and said solvent.

185-188. (Canceled)

189. (Withdrawn – Currently Amended) The method of Claim [[185]]207, wherein said cycloalkane solvent is selected from the group consisting of ~~alkanes, arenes, and cycloalkanes~~ C_5-C_{12} cycloalkanes.

190-191. (Canceled)

192. (Currently Amended) The method of Claim [[174]]207, wherein the ~~silicon~~ passivated semiconductor nanoparticles have a size distribution range such that at least 95% of the nanoparticles have an average particle diameter of from 0.1 nm to 10 nm.

193. (Currently Amended) The method of Claim 192, wherein the passivated semiconductor ~~silicon~~ nanoparticles have a size distribution range such that at least 98% of the nanoparticles have an average particle diameter from 0.5 nm to less than 5 nm.

194. (Currently Amended) The method of Claim 183, wherein said ~~cyclogermane or cyclosilagermane~~ first cyclic Group IVA compound is present in the solution in a percentage by weight of from 0.5 to 30 wt.%.

195. (Previously Presented) The method of Claim 194, wherein the first cyclic Group IVA compound is present in the solution in a percentage by weight of from 1.0 to 20 wt.%.

196. (Currently Amended) The method of Claim [[166]]207, wherein the substrate comprises a semiconductor wafer or a transparent or translucent display window with a two-dimensional array of fields thereon.

197. (Currently Amended) The method of Claim [[166]]207, wherein the substrate comprises a glass or plastic window.

198. (Canceled)

199. (Withdrawn – Currently Amended) The method of Claim [[166]]207, further comprising cleaning the substrate with the patterned semiconductor film thereon.

200. (Withdrawn) The method of Claim 199, wherein cleaning comprises rinsing the substrate with or immersing the substrate in a cleaning solvent, draining the cleaning solvent from the substrate, and drying the substrate and patterned semiconductor thin film.

201. (Withdrawn – Currently Amended) The method of Claim 199, wherein the cleaning solvent comprises a solvent in which the first cyclic Group IVA compound and/or said passivated semiconductor nanoparticles are substantially soluble ~~cyclogermane or cyclosilagermane has a high solubility~~.

202. (Canceled)

203. (Canceled)

204. (Previously Presented) The method of claim 41, further comprising irradiating said pattern after said printing and prior to said curing said printed pattern.

205. (Currently Amended) The method of claim [[166]]207, further comprising irradiating said pattern after said printing and prior to said curing said printed pattern.

206. (New) The method of Claim 41, wherein said silicon-containing semiconductor nanoparticles further comprise a dopant.

207. (New) A method of making a patterned semiconductor film, comprising the steps of:

a) printing a solution comprising passivated semiconductor nanoparticles, a first cyclic Group IVA compound of the formula (1):

$$(AH_x)_n, \qquad (1)$$

where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and each A in the formula is independently Si or Ge, and a cycloalkane solvent in a pattern on a substrate; and

b) curing said printed pattern to form said patterned semiconductor film.

208. (New) The method of Claim 207, wherein A is Si.

209. (New) The method of Claim 207, wherein said solution further comprises a second cyclic Group IVA compound of the formula (2):

$$(AH_x)_m(AH_yR_{z-y})_p(ZR')_q,$$

where (m + p + q) is from 3 to 12, each of the m instances of x is independently 0, 1 or 2, each of the p instances of y is independently 0, 1 or 2, each of the p instances of z is independently 0, 1 or 2, each of the p instances of (y + z) is independently 1 or 2, each of the q instances of w is independently 0 or 1, at least one of p and q is at least 1, each A in the formula (2) is independently Si or Ge, Z is selected from the group consisting of B, P and As, R' is R or H, and each R in the formula (2) is independently alkyl, $BH_sR"_{2-s}$, $PH_sR"_{2-s}$, $AsH_sR"_{2-s}$ or $AH_tR"_{3-t}$, where s is 0 to 2, t is 0 to 3, and R" is alkyl or AH_3.

210. (New) The method of Claim 209, wherein said passivated semiconductor nanoparticles, said first cyclic Group IVA compound and said second cyclic Group IVA compound are present in said ink in a percentage by weight of from 0.1% to 50%.

211. (New) A method of making a patterned semiconductor film, comprising the steps of:

a) printing a solution comprising passivated semiconductor nanoparticles, a first cyclic Group IVA compound of the formula (1):

$$(AH_x)_n, \qquad (1)$$

where n is from 3 to 8, each of the n instances of x is independently 1 or 2, and each A in the formula is independently Si or Ge, and a solvent in a pattern on a

substrate, wherein said pattern comprises one or more lines having a width of not more than 100 μm, a length of not more than 5000 μm, a thickness of not more than 1000 μm, and an inter-line spacing of not more than 100 μm; and

b) curing said printed pattern to form said patterned semiconductor film.

212. (New) The method of Claim 211, wherein said curing step comprises heating said pattern to a temperature of at least about 200 °C to sinter said passivated semiconductor nanoparticles in said pattern.

213. (New) The method of Claim 211, wherein said passivated semiconductor nanoparticles consist essentially of silicon nanoparticles and a passivation layer thereon.

214. (New) The method of Claim 213, wherein said passivation layer comprises at least one member selected from the group consisting of an alcohol, an alcoholate, a thiol, a thiolate, hydrogen, an alkyl group, an aryl group, and an aralkyl group.

215. (New) The method of Claim 211, wherein said passivated semiconductor nanoparticles have an average particle diameter of less than 5 nm.

216. (New) The method of Claim 211, wherein said passivated semiconductor nanoparticles have a particle size distribution of from 0.2 nm to less than 10 nm.

217. (New) The method of Claim 211, wherein A is Si.

218. (New) The method of Claim 217, wherein each x is 2.

219. (New) The method of Claim 218, wherein n is 5.

220. (New) The method of Claim 211, wherein said first cyclic Group IVA compound is present in said solution in a percentage by weight of from 0.1% to 50%.

221. (New) The method of Claim 211, wherein the solution consists essentially of said passivated semiconductor nanoparticles, said first cyclic Group IVA compound and said solvent.

222. (New) The method of Claim 211, wherein the substrate comprises a transparent or translucent display window with a two-dimensional array of fields thereon.

223. (New) The method of Claim 211, further comprising removing the solvent from the printed solution prior to curing.

224. (New) The method of Claim 211, further comprising irradiating said pattern after said printing and prior to said curing said printed pattern.

225. (New) The method of Claim 211, wherein said printing step comprises inkjet printing, gravure printing, offset lithography, or flexographic printing said solution in said pattern onto said substrate.

226. (New) The method of Claim 207, wherein said pattern comprises lines having a width of from 0.5 to 50 μm.

227. (New) The method of Claim 226, wherein said lines have an inter-line spacing of from 100 nm to 100 μm.

228. (New) The method of Claim 226, wherein said lines have a length of from 2 μm to 2000 μm.

229. (New) The method of Claim 226, wherein said lines have a thickness of from 0.01 μm to 500 μm.

230. (New) The method of Claim 207, wherein said pattern comprises one or more lines having a width of not more than 100 μm, a length of not more than 5000 μm, a thickness of not more than 1000 μm, and an inter-line spacing of not more than 100 μm.

231. (New) The method of Claim 41, wherein said printing step is conducted in an inert and/or reducing atmosphere.

232. (New) The method of Claim 207, wherein said printing step is conducted in an inert and/or reducing atmosphere.

233. (New) The method of Claim 211, wherein said printing step is conducted in an inert and/or reducing atmosphere.

234. (New) The method of Claim 207, wherein said passivated semiconductor nanoparticles further comprise a dopant.

235. (New) The method of Claim 211, wherein said passivated semiconductor nanoparticles further comprise a dopant.